

Remarks

Claims 1-18 are pending in the application.

New claims 19-21 have been added.

Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The drawings are objected to as being not readable.

Claims 1, 5-10 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,718,121 to Epworth et al. (hereinafter "Epworth") in view of U.S. Patent Application Publication No. 2004/0120356 to Davenport et al. (hereinafter "Davenport").

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of U.S. Patent No. 7,092,645 to Sternowski et al. (hereinafter "Sternowski").

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of O'Rourke et al. (hereinafter "O'Rourke").

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of U.S. Patent No. 6,907,052 to Kozlowski et al. (hereinafter "Kozlowski").

Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of U.S. Patent No. 6,692,973 to Huber et al. (hereinafter "Huber").

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of Huber and further in view of U.S. Patent Publication No. 2004/0047561 to Tuda et al. (hereinafter "Tuda").

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of Huber and further in view of U.S. Patent Publication No. 2002/0126346 to Suzuki et al. (hereinafter "Suzuki").

Each of the various rejections and objections are overcome by amendments that are made to the specification, drawing, and/or claims, as well as, or in the alternative, by various arguments that are presented.

Any amendments to any claim for reasons other than as expressly recited herein as being for the purpose of distinguishing such claim from known prior art are not being made with an intent to change in any way the literal scope of such claims or the range of equivalents for such claims. They are being made simply to present language that is better in conformance with the form requirements of Title 35 of the United States Code or is simply clearer and easier to understand than the originally presented language. Any amendments to any claim expressly made in order to distinguish such claim from known prior art are being made only with an intent to change the literal scope of such claim in the most minimal way, i.e., to just avoid the prior art in a way that leaves the claim novel and not obvious in view of the cited prior art, and no equivalent of any subject matter remaining in the claim is intended to be surrendered.

Also, since a dependent claim inherently includes the recitations of the claim or chain of claims from which it depends, it is submitted that the scope and content of any dependent claims that have been herein rewritten in independent form is exactly the same as the scope and content of those claims prior to having been rewritten in independent form. That is, although by convention such rewritten claims are labeled herein as having been "amended," it is submitted that only the format, and not the content, of these claims has been changed. This is true whether a dependent claim has been rewritten to expressly include the limitations of those claims on which it formerly depended or whether an independent claim has been rewriting to include the limitations of claims that previously depended from it. Thus, by such rewriting no equivalent of any subject matter of the original dependent claim is intended to be surrendered. If the Examiner is of a different view, he is respectfully requested to so indicate.

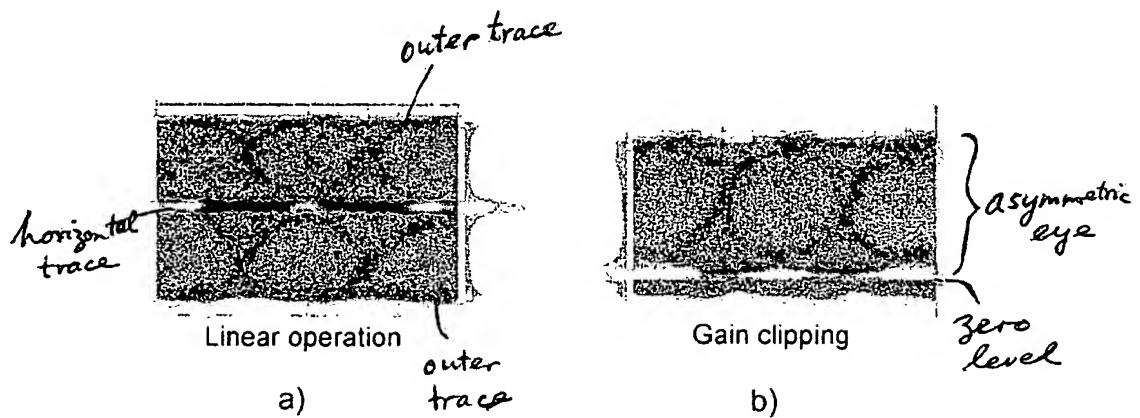
Objection to the Drawing

Figures 2(a) and 2(b) were objected to because they are not readable.

Applicant has submitted a replacement sheet for these drawings with improved contrast, which should help with better visualization of the figures. This sheet has been labeled as a Replacement Sheet.

Applicant submits that Figs. 2(a)-(b) represent data that were captured as traces from a sampling oscilloscope, i.e., voltage outputs $U(t)$ at linear operation and $U_G(t)$ with gain clipping, respectively. These are also commonly referred to as the eye diagrams. Unlike the usual "open" eye diagrams that one may be more accustomed to, the eyes in Figs. 2(a)-(b) appear "closed" because of the existence of beat signal arising between the local oscillator (LO) signal ω_L and the incoming data signal ω_s (since the LO signal and the data signal are not phase-coupled).

To help with visualizing the figures, a mark-up version is also reproduced below, with traces of the eye diagrams highlighted and corresponding labels added in accordance with the specification (p.7, lines 1-13).



Applicant submits that the replacement sheet for Figs. 2(a)-(b) is of sufficient quality for one skilled in the art to discern the features of interest, and respectfully request that the objection be withdrawn.

Objection to Claim 12

Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant thanks the Examiner for indicating the allowable subject matter in this claim. However, as set forth below, Applicant submits that independent claim 11, from which claim 12 depends, is allowable over the cited references. As such, claim 12 is allowable in its dependent form.

Therefore, the Examiner's objection to claim 12 should be withdrawn.

Rejection Under 35 U.S.C. 103(a)

Claims 1, 5-10 and 16-18

Claims 1, 5-10 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport. The rejection is traversed.

Claim 17 was canceled in the amendment filed on December 13, 2006, and its rejection is therefore moot.

Applicant submits that there is no motivation to combine Epworth and Davenport, and even if combined, these references would not have resulted in Applicant's invention.

The Office Action acknowledged that Epworth fails to disclose certain signal processing such as post amplification and logic signal production. Thus, Davenport was cited for disclosing features corresponding to Applicants' gain clipped post amplifier and a decision circuit.

The Office Action further stated that a motivation for combining Epworth with Davenport is to create discernable binary data to be used by data processing at the receiver (p. 4, Office Action). Applicant disagrees that such a motivation exists.

Specifically, Epworth teaches a coherent optical receiver for optical communications, in which local oscillator intensity fluctuations are nulled out by cross-correlation with an imperfectly balanced output to derive an error signal used in a feedback loop to optimize the balance (see Epworth's Abstract and Field of the Invention). Epworth does not suggest any deficiencies in the balanced signal of the optical receiver

that would require modifications, e.g., by using components from Davenport, to "create discernable binary data," as stated in the Office Action.

Applicant maintains that there is no motivation to combine Epworth with Davenport because of the vastly different technologies and problems addressed by these two references, i.e., the two references are non-analogous arts.

Specifically, Davenport's system relates to a warning system, such as that at railroad crossings, having sensors coupled to a microprocessor using the Controller Area Network (CAN) protocol (see Davenport's Abstract and Background). Davenport's full wave rectifier 600 and comparator circuit 900 were cited in the Office Action as corresponding to Applicant's gain clipped amplifier and data decision circuit, respectively.

However, these two components are only portions of a receiver circuit 500 used for converting an analog signal from a power supply line 502 into a binary data 504 for input to a receiver (Davenport, Fig. 5 and para. 42), with the receiver circuit being part of a sensor module 104 for a railroad crossing flashing light system (Davenport, Figs. 1-2).

There is nothing similar between the analog to digital conversion circuit for electrical signals in Davenport's sensor system and Epworth's optical signal receiver in optical communications system, as to justify a combination of these two references.

Furthermore, Applicant submits that the teaching of Davenport must be considered in its proper context as a whole. For example, Davenport's full wave rectifier 600 and comparator 900 are used in conjunction with several other electrical component blocks to provide for analog to digital conversion of an electrical signal.

The Office Action's random selection of two components from Davenport's circuit for use in Epworth's optical receiver (designed for use in a totally different technology), can only be a result of impermissible hindsight based on Applicant's disclosure.

On page 12 of the Office Action, Examiner attempted to justify the combination by stating that both Epworth and Davenport "share the need for improving the quality of an electrical data signal", and that Davenport's post-amplification can be applied to quite a large amount of different technologies. Examiner further stated that optical communications have the ability to communicate in any frequency range, including the 100kHz range taught by Davenport (page 13, Office Action).

Although Applicant does not contend that, in general, most electrical circuits would share a need for improving signal quality, it is highly unlikely that one skilled in the art would have found it desirable to adapt Davenport's post-amplification in the 100kHz range for use in an optical receiver for optical communications, with frequency typically in the GHz range. Thus, Applicant submits that it would not have been obvious for one skilled in the art to modify an optical receiver to work in the 100kHz range, instead of the typical GHz range.

Furthermore, even if combined, Epworth and Davenport would not have resulted in Applicant's claimed invention because certain features in Applicant's invention are still not taught in the combined references.

For example, contrary to what was stated in the Office Action, Epworth does not teach a tunable local oscillator (LO) in Figs. 1-7, or a gain clipped amplifier. Examiner stated on p.12 of the Office Action that Epworth "clearly states that the amplitude of the local oscillator can be directly tuned (column 3 lines 19-22)."

Applicant submits that the above cited portion of Epworth teaches only amplitude modulation, which is consistent with Epworth's Fig. 5B showing the LO output as being subjected to intensity modulation. However, intensity or amplitude modulation of a LO is not the same as a tunable LO. As one skilled in the art would understand, the tunability of a LO refers to the tuning of frequency or wavelength (e.g., see Applicant's specification, p.2, lines 15-16: "a tunable oscillator circuit for outputting a predetermined local oscillation frequency signal", and p.5, lines 9-10, teaching one example of the LO as a tunable laser diode.

By contrast, Epworth's amplitude modulation does not provide any tunable frequency output from the LO. In fact, Epworth's LO has to be fixed in frequency in order to provide a balanced signal for processing.

Furthermore, neither Epworth nor Davenport teaches any gain clipped amplifier.

Davenport's Fig. 5 shows a full wave rectifier 600 in a receiver circuit for a power line network. This full wave rectifier is different from a gain-clipped amplifier, and also produces a different result.

For example, Applicant's gain-clipped amplifier leads to half-wave rectification (e.g., see Applicant's Fig. 1), while Davenport's rectifier results in full-wave rectification.

Thus, even if Epworth's coherent optical receiver were to be combined with Davenport's full-wave rectifier and comparator circuit, the combined teaching would not have resulted in Applicant's receiver with a wavelength-tunable oscillator circuit and a gain clipped amplifier, as arranged in Applicant's claim 1.

As such, Applicant submits that independent claim 1 is patentable over Epworth in view of Davenport under 35 U.S.C. 103(a).

Independent claims 16 and 18 recite similar relevant limitations as recited in claim 1. As such, for at least the same reasons discussed above with respect to independent claim 1, independent claims 16 and 18 are also patentable over Epworth in view of Davenport under 35 U.S.C. 103(a).

Since all of the dependent claims that depend from the independent claims include all the limitations of the respective independent claims from which they ultimately depend, each such dependent claim is also patentable over Epworth in view of Davenport under 35 U.S.C. 103(a).

Therefore, the Examiner's rejection should be withdrawn.

Claim 2

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of Sternowski. The rejection is traversed.

The ground of rejection applies only to dependent claims, and is predicated on the validity of the rejection under 35 U.S.C. 103 given Epworth in view of Davenport. Since the rejection under 35 U.S.C. 103 given Epworth in view of Davenport has been overcome, as described hereinabove, and there is no argument put forth by the Office Action that Sternowski supplies all the features that are missing from Epworth in view of Davenport to render the independent claims obvious, this ground of rejection cannot be maintained. As such, claim 2 is patentable under 35 U.S.C. 103(a) over Epworth in view of Davenport and further in view of Sternowski.

Therefore, the Examiner's rejection should be withdrawn.

Claim 3

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of O'Rourke. (Applicant notes that a citation was not provided in the Office Action for the O'Rourke reference.)

The ground of rejection applies only to dependent claims, and is predicated on the validity of the rejection under 35 U.S.C. 103 given Epworth in view of Davenport. Since the rejection under 35 U.S.C. 103 given Epworth in view of Davenport has been overcome, as described hereinabove, and there is no argument put forth by the Office Action that O'Rourke supplies all the features that are missing from Epworth in view of Davenport to render the independent claims obvious, this ground of rejection cannot be maintained. As such, claim 3 is patentable under 35 U.S.C. 103(a) over Epworth in view of Davenport and further in view of O'Rourke.

Therefore, the Examiner's rejection should be withdrawn.

Claim 4

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of Kozlowski. The rejection is traversed.

The ground of rejection applies only to dependent claims, and is predicated on the validity of the rejection under 35 U.S.C. 103 given Epworth in view of Davenport. Since the rejection under 35 U.S.C. 103 given Epworth in view of Davenport has been overcome, as described hereinabove, and there is no argument put forth by the Office Action that Kozlowski supplies all the features that are missing from Epworth in view of Davenport to render the independent claims obvious, this ground of rejection cannot be maintained. As such, claim 4 is patentable under 35 U.S.C. 103(a) over Epworth in view of Davenport and further in view of Kozlowski.

Therefore, the Examiner's rejection should be withdrawn.

Claims 11 and 13

Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of Huber.

Independent claim 11 recites relevant limitations similar to those recited in independent claims 1, 16 and 18. For at least the reasons discussed above with respect to the Examiner's rejection of claims 1, 16 and 18, claim 11 is patentable under 35 U.S.C. 103(a) over Epworth in view of Davenport.

Huber, which was cited in the Office Action as disclosing optical transmitters, a multiplexer, and a power splitter, fails to bridge the substantial gap between Epworth and Davenport and Applicant's invention.

As such, Applicant submits that independent claim 11 is patentable over Epworth in view of Davenport and further in view of Huber under 35 U.S.C. 103(a).

Since all of the dependent claims that depend from the independent claims include all the limitations of the respective independent claims from which they ultimately depend, each such dependent claim is also patentable over Epworth in view of Davenport and further in view of Davenport under 35 U.S.C. 103(a).

Therefore, the Examiner's rejection should be withdrawn.

Claim 14

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of Huber and further in view of Tuda. The rejection is traversed.

The ground of rejection applies only to dependent claims, and is predicated on the validity of the rejection under 35 U.S.C. 103 given Epworth in view of Davenport and further in view of Huber. Since the rejection under 35 U.S.C. 103 given Epworth in view of Davenport and further in view of Huber has been overcome, as described hereinabove, and there is no argument put forth by the Office Action that Tuda supplies all the features that are missing from Epworth in view of Davenport and further in view of Huber to render the independent claims obvious, this ground of rejection cannot be maintained. As such, claim 14 is patentable under 35 U.S.C. 103(a) over Epworth in view of Davenport and further in view of Huber and further in view of Tuda.

Claim 15

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth in view of Davenport and further in view of Huber and further in view of Suzuki. The rejection is traversed.

The ground of rejection applies only to dependent claims, and is predicated on the validity of the rejection under 35 U.S.C. 103 given Epworth in view of Davenport and further in view of Huber. Since the rejection under 35 U.S.C. 103 given Epworth in view of Davenport and further in view of Huber has been overcome, as described hereinabove, and there is no argument put forth by the Office Action that Suzuki supplies all the features that are missing from Epworth in view of Davenport and further in view of Huber to render the independent claims obvious, this ground of rejection cannot be maintained. As such, claim 15 is patentable under 35 U.S.C. 103(a) over Epworth in view of Davenport and further in view of Huber and further in view of Suzuki.

Therefore, the Examiner's rejection should be withdrawn.

Allowable Subject Matter

Applicant thanks Examiner for indicating that claim 12 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, for reasons set forth above, Applicant submits that these claims are also allowable in their existing dependent form.

New Claims

New claims 19-21 have been added to depend from claims 1, 16 and 18, respectively. These claims each recites "wherein the substantially similar mixed signals each has a frequency of at least a GHz" are fully supported by the original specification, e.g., at least on p.5, lines 10-12. As such, no new matter has been added.

Applicant submits that, for at least the same reasons set forth above for claims 1, 16 and 18, these dependent claims are also patentable over the cited references.

Conclusion

It is respectfully submitted that the Office Action's rejections have been overcome and that this application is now in condition for allowance. Reconsideration and allowance are, therefore, respectfully solicited.

If, however, the Examiner still believes that there are unresolved issues, the Examiner is invited to call Eamon Wall at (732) 530-9404 so that arrangements may be made to discuss and resolve any such issues.

Respectfully submitted,

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